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DIOPHANTINE ANALYSIS.

Conducted by J. M. COLAW, Monterey, Va. All contributions to this department should be sent to him.

SOLUTIONS OF PROBLEMS.

34. Proposed by R. H. YOUNG, West Sunbury, Pennsylvania.

Prove (1) that $\frac{n(n+1)(2n+1)}{6}$ is a whole number for all values of n; and (2) prove that $\frac{n(n-1)(n+1}{24}$ is a whole number when n is odd.

I. Solution by COOPER D. SCHMITT, A. M., Professor of Mathematics, University of Tennessee, Knoxville, Tennessee.

(1). $1^2+2^2+3^2+4^2+\ldots\ldots..+n^2=\frac{n(n+1)(2n+1)}{6}=$a whole number for all integral values of n.

(2). Let $n=2m+1=$an odd number for all integral values of m.

$\therefore \frac{(n-1)n(n+1)}{24}=\frac{m(m+1)(2m+1)}{6}=$same as (1).

II. Solution by JOSIAH H. DRUMMOND, LL. D., Portland, Maine.

As n and $n+1$ are consecutive numbers, one of them must be even and so divisible by two. But n must be of the form of $3p$, $3p+1$, or $3p+2$. If of the form of $3p$, it is divisible by three; if of the form $3p+2$, then $n+1$ or $3p+3$ is divisible by three; if of the form $3p+1$, then $(2n+1)$ becomes $6p+3$, and is divisible by three. Hence $n(n+1)(2n+1)$ is divisible by twice three, or six, whatever the value of n is.

2. $(n-1)n(n+1)$ of which the middle one is odd. One of every three consecutive numbers is always divisible by three: one of two consecutive *even* numbers is always divisible by four and the other by two. Hence $(n-1)n(n+1)$, when n is odd, is always divisible by $2\times3\times4$ or 24.

Also solved by *O. W. ANTHONY, M. A. GRUBER, EDGAR KESNER, E. W. MORRELL, J. SCHEFFER, E. L. SHERWOOD, B. F. YANNEY*, and *G. B. M. ZERR*.

35. Proposed by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Applied Science in Texarkana College, Texarkana, Arkansas-Texas.

Decompose into the sum of two squares the number $13^2.61^3$.

I. Solution by E. L. SHERWOOD, A. M., Professor of Mathematics in Mississippi Normal College, Houston, Miss., and E. W. MORRELL, Department of Mathematics in Montpelier Seminary, Montpelier, Vermont.

$13^2.61^3=13^2.61^2.61=13^2.61^2(5^2+6^2)=13^2.61^2.5^2+13^2.61^2.6^2$.

II. Solution by M. A. GRUBER, A. M., War Department, Washington, D. C.

Put $13^2.61^3=(p^2+q^2)^2(m^2+n^2)^3$, in which $p=3$, $q=2$, $m=6$, $n=5$. By decomposing into the sum of two squares, we find